

*If you are using a printed copy of this procedure, and not the on-screen version, then you **MUST** make sure the dates at the bottom of the printed copy and the on-screen version match. The on-screen version of the Collider-Accelerator Department Procedure is the Official Version. Hard copies of all signed, official, C-A Operating Procedures are kept on file in the C-A ESHQ Training Office, Bldg. 911A.*

## C-A OPERATIONS PROCEDURES MANUAL

### 7.1.33 Insulating Vacuum System #5 for Turbine Pods 3,4,5 and 6

Text Pages 2 through 5

#### Hand Processed Changes

<u>HPC No.</u>	<u>Date</u>	<u>Page Nos.</u>	<u>Initials</u>
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

Approved: \_\_\_\_\_ ***Signature on File*** \_\_\_\_\_  
 Collider-Accelerator Department Chairman Date

D. Lederle

### **7.1.33 Insulating Vacuum System #5 for Turbine Pods 3,4,5 and 6**

#### **1. Purpose**

This procedure provides instructions for the operation of vacuum skid 5 for the insulating vacuum of turbine pods 3 and 4 (for Expander 3A, 4A, 3B and 4B) and 5 and 6 (for Expander 5A, 6A, 5B, and 6B) of the RHIC 25 kW helium refrigerator. The vacuum skid consists of two sets of Kinney fore pumps, 5-E515 and 5-E565, two sets of Varian diffusion pumps, 5-E511 and 5-E561, interconnecting piping, valves, instrumentation and control. Under normal operation, 5-E511 and 5-E515 are dedicated for turbine pods 3 and 4. 5-E561 and 5-E565 are dedicated for turbine pods 5 and 6.

#### **2. Responsibilities**

- 2.1 The Shift Supervisor, or an Operator designated by the Shift Supervisor, is responsible for conducting the procedure and providing documentation in the Cryogenic Control Room Logbook.
- 2.2 Should a problem arise during the completion of this procedure, the Shift Supervisor shall contact the Technical Supervisor for instructions before continuing.

#### **3. Prerequisites**

- 3.1 The operator shall become familiar with the Vacuum System #5 P&I D drawing 3A995010.
- 3.2 The diffusion pumps are mounted on the 4 inch penetration between the turbine pods 3,5 and 4,6. The fore pumps, the control panel and the rest of the vacuum skid are located on the lower level of the refrigerator building. The operator shall familiarize himself with the locations of the hardware.
- 3.3 The control panel consists of control switches, vacuum gages and the status for the control valves, the slide valves, the fore pumps and the diffusion pumps. The operator shall familiarize himself with the function of the control panel.
- 3.4 The operator shall become familiar with the operation of the Kinney KTC-60 compound vacuum pump and the Varian diffusion pump.

#### 4. **Precautions**

- 4.1 General safety precautions on the operation of cryogenic system.
- 4.2 The bottom of the diffusion pump will be very hot. The operator shall not touch it.
- 4.3 The Diffusion Pumps have high temperature alarms which are initiated by the following instruments:

Diffusion Pump 5-E511 High Temperature	5-TSH511
Diffusion Pump 5-E561 High Temperature	5-TSH561

#### 5. **Procedure**

##### 5.1 **Check the Oil**

- \_\_\_\_\_ [1] Check the oil level from the dip gage of the diffusion pumps and sight glass of the fore pumps.
- \_\_\_\_\_ [2] If oil level is too low, report to the supervisor for adding oil. Record in logbook.
- \_\_\_\_\_ [3] If oil is milky, report to the supervisor for changing pump oil. Record in logbook.

##### 5.2 **Service Utilities**

- \_\_\_\_\_ [1] Open the water inlet valves, 5-W528M and 5-W578M, and the outlet valves, 5-W527M and 5-W577M to cool the two baffles, 5-E581 and 5-E531, and the two diffusion pumps, 5-E561 and 5-E511. Adjust flow rates to 15 gallons per hour for both 5-FI-528W and 5-FI-578W.
- \_\_\_\_\_ [2] Check air pressure from gage located upstream of 5-A523M. Instrument air shall be between 80 and 100 psig. Open air supply valves 5-A523M, 5-A529M and 5-A579M on the skid.
- \_\_\_\_\_ [3] Supply electric power from circuit 2 of the Main Distribution Panel to motor control center MCC. The switch is located on the south wall across the walk way from vacuum skid 1 in the lower level of the refrigerator building.

- \_\_\_\_\_ [4] Supply power to the motors of fore pumps 5-E515 and 5-E565, and to diffusion pumps 5-E561 and 5-E511 from the electric feed from the main distribution panel located on the east side on the lower level of the refrigerator building.
- \_\_\_\_\_ [5] Turn on the vacuum skids 5 circuit breakers 19, 21 and 23 on the RP-2 panel located near local instrumentation panel 2.

### 5.3 Operating the Vacuum Skid

#### 5.3.1 Initial Valve Positions

- \_\_\_\_\_ [1] Crack open the isolation valves 5-V513M and 5-V563M for fore pumps 5-E515 and 5-E565.
- \_\_\_\_\_ [2] Close the isolation valve 5-V526M.

#### 5.3.2 Turn On the Control Switch

- \_\_\_\_\_ [1] The operation of the vacuum skid is automatic and one control switch 5-HS500 starts the system for turbine pods 3 and 4 and a second control switch 5-HS550 starts the system for turbine pods 5 and 6. The control sources are located on the lower part of the control panel for vacuum skid 5 and each system can be pumped down independently.
- \_\_\_\_\_ [2] By turning on the control switch 5-HS500, the turbine pods 3 and 4, automatic valves 5-V509A, 5-V520A and 5-V510A will be closed and the fore pump 5-E515 will be turned on. By turning on the control switch 5-HS550, the turbine pods 5 and 6, automatic valves 5-V559A, 5-V570A and 5-V560A will be closed and the fore pump 5-E565 will be turned on.
- \_\_\_\_\_ [3] After approximately two minutes time delay, the control logic will open 5-V509A, 5-V510A and 5-V520A for turbine pods 3 and 4 and 5-V559A, 5-V560A and 5-V570A for turbine pods 5 and 6 and start to pump down the vacuum space.
- \_\_\_\_\_ [4] During the initial roughing stage, gradually open 5-V513M and 5-V563M while listening to the sound of the fore pumps to avoid overloading the pumps.
- \_\_\_\_\_ [5] Check the level and condition of the pump oil on the sight glass of the fore pumps.

- \_\_\_\_\_ [6] If the oil becomes milky, the operator should first open the ballast valve to remove water vapor contained in the pump oil. Wait for 30 minutes and close the ballast valve.
- \_\_\_\_\_ [7] Repeat step 5 and 6 if necessary. Should the condition of the oil not improve, then the operator shall report to the supervision for changing pump oil.
- \_\_\_\_\_ [8] Fully open 5-V513M for turbine pods 3 and 4 and 5-V563M for turbine pods 5 and 6 when the vacuum reaches 100 Torr.
- \_\_\_\_\_ [9] When the vacuum decreases to the set point (about 2 miliTorr) of vacuum gage 5PI-501V for turbine pods 3 and 4 and 5PI-551V for turbine pods 5 and 6, 5-V509A and 5-V520A for turbine pods 3 and 4 and 5-V559A and 5-V570A for turbine pods 5 and 6 will be closed.
- \_\_\_\_\_ [10] Slide valves 5-V504A for turbine pods 3 and 4 and 5-V554A for turbine pods 5 and 6, will be open and the diffusion pumps will be turned on for final stage of pump down. Both slide valves can be opened or closed with toggle switches located inside the control panel.
- \_\_\_\_\_ [11] If the insulating vacuum 5PI-501V and 5PI-502V for turbine pods 3 and 4 and 5PI-552V and 5PI-551V for turbine pods 5 and 6, do not improve over expected time period, the operator should report to the supervisor for suitable action.

## 6. **Documentation**

- 6.1 The check-off lines on the procedure are for place-keeping only. The procedure is not to be initialed or signed, it is not a record.
- 6.2 The Shift Supervisor, or designee, shall document the completion of the procedure in the Cryogenics Control Room Log.

## 7. **References**

- 7.1 Drawing 3A995010

## 8. **Attachments**

None